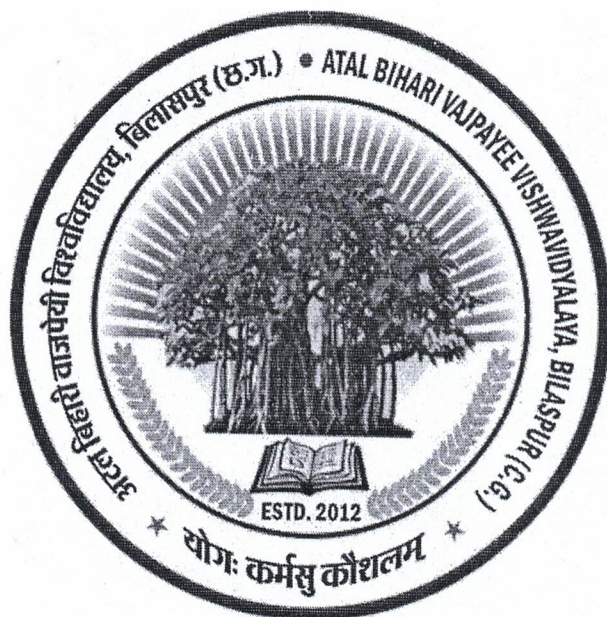# Department of Computer Science and Application
Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur (C.G.)

Learning Outcome Based Scheme and Syllabus

of

Master of Technology in Computer Science

(AICTE Approved)

(As approved by AC/EC in its meeting held respectively on...)

Course Effective from Academic Session 2022-23

Department of Computer Science and Application
Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur (C.G.)
Scheme and Syllabus
of
Master of Technology in Computer Science
(Approved by AICTE w.e.f. Academic Session 2022-23)
PROGRAMME CODE: MTCS2022

Semester – I

S. No.	Course Type	Course Code	Course Name	L	T	P	Total	ESE	IA	Max	Min
1	Core Course (CC)	MTCS101	Python Programming	2	1	-	3	75	25	100	40
2		MTCS102	Artificial Intelligence and Machine Learning	2	1	-	3	75	25	100	40
3		MTCS103	Introduction to Data Science	2	1	-	3	75	25	100	40
4		MTCS104	Lab-1: Python Programming	-	-	2	2	75	25	100	40
5		MTCS105	Research Methodology and IPR	2	-	-	2	50	-	50	20
6	Elective-I (Choose any one)	MTCS106	Cloud Computing	2	1	-	3	75	25	100	40
7		MTCS107	Soft Computing								
8		MTCS108	Block Chain Technology								
9	Audit course	MTCS109	MOOC/ Workshop/Conference etc.	-	-	2	2	-	50	50	20
10		MTCS110	Stress Management by Yoga								
	Total			10	4	4	18	425	175	600	-

Abbreviation: L-Lecture, P-Practical, T-Tutorial, ESE-End Semester Examination, IA-Internal Assessment.

Semester – II

S. No.	Course Type	Course Code	Course Name	Credit				Marks			Total	
				L	T	P	Total	ESE	IA	Max	Min
1	Core Course (CC)	MTCS201	Cryptography and Network Security	2	1	-	3	75	25	100	40
2		MTCS202	Deep Learning	2	1	-	3	75	25	100	40
3		MTCS203	Big Data Analytics	2	1	-	3	75	25	100	40
4		MTCS204	Lab-2: Deep Learning	-	-	2	2	75	25	100	40
5	Elective-II (Choose any one)	MTCS205	Image Processing	2	1	-	3	75	25	100	40
6		MTCS206	Internet of Things								
7		MTCS207	Natural Language Processing								
8		MTCS208	Research Paper Writing	2	-	-	2	50	-	50	20
9	Audit course	MTCS209	MOOC/Internship	-	-	2	2	-	50	50	20
10											
	Total			10	4	4	18	475	125	600	-

Abbreviation: L-Lecture, P-Practical, T-Tutorial, ESE-End Semester Examination, IA-Internal Assessment.

Semester – III

S. No.	Course Type	Course Code	Dissertation	Credit				Marks		Total	
				L	T	P	Total	ESE	IA	Max	Min
1	Dissertation	MTCS301	Dissertation Phase –I	-	-	14	14	500	-	500	200
2	Online course and Patent	MTCS302	MOOC/Patent	-	-	2	2	-	100	100	40
			Total	-	-	16	16	500	100	600	-

Abbreviation: L-Lecture, P-Practical, T-Tutorial, ESE-End Semester Examination, IA-Internal Assessment.

Semester – IV

S. No.	Course Type	Course Code	Dissertation	Credit				Marks		Total	
				L	T	P	Total	ESE	IA	Max	Min
1	Dissertation	MTCS401	Dissertation Phase –II	-	-	16	16	500	-	500	200
2	Online course and patent	MTCS402	MOOC/Patent	-	-	2	2	-	100	100	40
			Total	-	-	18	18	500	100	600	-
			Grand Total (Semester I, II, III and IV)	-	-	-	70	1850	550	2400	-

Abbreviation: L-Lecture, P-Practical, T-Tutorial, ESE-End Semester Examination, IA-Internal Assessment.

Department of Computer Science and Application

Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur (C.G.)

Scheme and Syllabus

of

Master of Technology in Computer Science

(Approved by AICTE w.e.f. Academic Session 2022-23)
PROGRAMME CODE: MTCS2022

OBJECTIVES:

M.Tech. Programme in Computer Science aims at developing professionals having strong foundation in Computer Science as well as Information Technology who can contribute in research, academics and industry. The programme puts emphasis on learning by solving problems through laboratory exercises and software development/research projects.

ELIGIBILITY:

GATE qualified in CSE/ECE with 4 years of study at university level/ B.E./ B. Tech (CSE/ IT/ Comp. related subjects)/ M.C.A./ M.Sc.(CS/IT) with 55 % marks in aggregate. Relaxation of 5% as per C.G. Govt./ University.

AGE LIMIT:

As per the directives of Government of C.G. Government/University, there is no upper age limit for admission in the programme.

DURATION: Four Semesters (Two Years).

SCHOLARSHIPS:

Scholarship will be provided to the GATE qualified candidates by AICTE through DBT (Direct Benefit Transfer). Candidates must note that the University/Department does not take any responsibility in this regard.

PROGRAMME OUTCOMES (POs):

The main outcomes of the M.Tech. (CS) program are given here. At the end of the program a student is expected to have:

PO-1: An understanding of the theoretical foundations and the limits of computing.

PO-2: Understanding and ability to use advanced computing techniques and tools.

PO-3: Understand and apply programming knowledge to solve complex problems not just by using technology, but also to contribute in creation of new & emerging technologies which meet the desired needs of industry and society.

PO-4: Understand the impact of technology & its applications and provide solutions to the end user in a cost effective and efficient manner.

PO-5: Function in multidisciplinary teams and communicate with the team and clients in an effective manner.

PO-6: An ability to adapt existing design patterns, techniques, algorithms, data structures, etc. to solve real world problems.

PO-7: An understanding of professional and ethical responsibility.

PO-8: Understand the impact of IT related solutions in socioeconomic context.

PO-9: Build a strong foundation for research in future & emerging technological trends.

PO-10: Emphasize on life-long learning considering the ever changing technological environment.

PO-11: An ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society.

PO-12: An ability to undertake original research at the cutting edge of computer science & its related areas.

PO-13: An ability to function effectively individually or as a part of a team to accomplish a stated goal.

PO-14: An ability to communicate effectively with a wide range of audience.

PO-15: An ability to learn independently and engage in life¬long learning.

Part A: Introduction				
Program: **Master Degree**	Class: **M. Tech. (CS) I Year**		Semester: **I**	w.e.f. Academic Session: **2022-23**
1.	Course Code	MTCS101		
2.	Course Title	**Python Programming**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic knowledge of programming concepts		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: - Define the structure and components of a Python program. - Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. - Discover the commonly used operations involving regular expressions and file system. - Determine the need for scraping websites and working with CSV, JSON and other file formats. - Interpret the concepts of Object-Oriented Programming as used in Python.			
6.	**Credit Value**	**4**		
7.	**Total Marks**	**Max. Marks: 100**		**Min. Marks: 40**

Part B: Content of the Course		
Total Hours/Lectures: 60		
Unit	**Topics**	**No. of Lectures**
I.	**Brief Overview of Python's Basic:** Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation, Python Interpreter, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators, Input and Output Statements, Control statements, Functions, default arguments, class.	12
II.	**Python Libraries:** numpy: array, vector, matrix, matrix manipulation etc. pandas: Series and Data Frame, Data Wrangling etc. matplotlib: Generating different types of plot and charts for data analysis etc.	12
III.	**Regular Expression and Web scrapping:** Introduction of RE packages and its important functions, introduction of Web scrapping, process of web scrapping, scripts writing for web scrapping etc. pre-processing the downloaded data using web scraper.	12
IV.	**Implementations using Scikit-Learn: Supervised learning:** Linear Regression Logistic Regression, Decision tree Algorithms, Classification, Naive- Bayes', KNN Classification, Curse of Dimensionality-PCA, SVM Classification **Unsupervised learning:** Clustering, k-means clustering, Random Forest.	12
V.	**Case Studies:** Sentiment Analysis, Natural Language Processing, Speech Emotion Recognition or Classification, Computer Vision etc.	12
Keywords: List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.		

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Python, 2012.
3. Mark Lutz, Learning Python.
4. Tony Gaddis, Starting Out With Python.
5. Kenneth A. Lambert, Fundamentals of Python.
6. James Payne, Beginning Python using Python 2.6 and Python 3.

E-RESOURCES:

1. https://copyassignment.com/python/
2. SWAYAM/NPTEL: https://www.youtube.com/channel/UCxu1cR5XRauYn37yg-Fh6rA
3. SWAYAM/NPTEL: https://www.youtube.com/channel/UCJAgw1niUkaShdmA5aAZdQw
4. Introduction to Python Programming from Coursera: https://www.coursera.org/learn/python-programming-intro
5. Crash Course on Python from Coursera: https://www.coursera.org/learn/python-crash-course
6. Python for everybody: https://www.coursera.org/specializations/python
7. https://www.youtube.com/watch?v=XGJpThSjEPw&list=PLkkt2qQlhbKYX2Osxb-vy5qB7N-SU7IRS
8. Introduction: https://www.w3schools.com/python/default.asp
9. File Handling: https://www.w3schools.com/python/python_file_handling.asp
10. NumPy: https://www.w3schools.com/python/numpy/default.asp
11. Pandas: https://www.w3schools.com/python/pandas/default.asp
12. SciPy: https://www.w3schools.com/python/scipy/index.php
13. Django: https://www.w3schools.com/django/index.php
14. Matplotlib: https://www.w3schools.com/python/matplotlib_intro.asp
15. Machine Learning: https://www.w3schools.com/python/python_ml_getting_started.asp
16. Python MySQL: https://www.w3schools.com/python/python_mysql_getstarted.asp
17. Introduction to Scripting in Python Specialization: https://www.coursera.org/specializations/introduction-scripting-in-python
18. Topics related to Python from Tutorials:
    https://www.javatpoint.com/python-tutorial
    http://docs.python.org/3/tutorial/index.html
    http://interactivepython.org/courselib/static/pythonds
    http://www.ibiblio.org/g2swap/byteofpython/read/

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
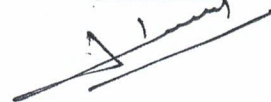Internal Assessment(IA): 25 Marks

Internal Assessment:		Total: 25 Marks
(i)	**Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered.	
(ii)	**Presentation/Assignment (10 Marks)**	

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   — Chairman

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   — Member
   (Online Present)

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   — Member

7. **Dr. S. Pavani**
   Asst. Prof. and P.G. Head,
   C.M. Dubey P.G. College, Bilaspur(C.G.)

   — Member

Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **I**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS103
2.	Course Title	**Introduction to Data Science**
3.	Course Type	**Theory**
4.	Pre-requisite (if any)	A Basic knowledge of programming and database management system
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Explain how data is collected, managed and stored for data science. • Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists. • Implement data collection and management scripts using MongoDB. • Demonstrate an understanding of statistics and machine learning concepts that are vital for data science. • Produce Python code to statistically analyse a dataset. • Critically evaluate data visualisations based on their design and use for communicating stories from data.
6.	**Credit Value**	4
7.	**Total Marks**	**Max. Marks: 100** / **Min. Marks: 40**

Part B: Content of the Course

Total Hours/Lectures: 60

Unit	Topics	No. of Lectures
I.	**Introduction to core concepts and technologies:** Introduction, Terminology, Data science process, Data science toolkit, Types of data, Example applications.	12
II.	**Data collection and management:** Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data Sources.	12
III.	**Data analysis:** Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.	12
IV.	**Data visualisation:** Introduction, Types of data visualisation, Data for visualisation: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings, Technologies for visualisation, Bokeh (Python).	12
V.	**Applications and Recent Trends:** Applications of Data Science, Recent trends in various data collection and analysis techniques, Application development methods of used in data science.	12

Keywords: Data Science, Variance, Naïve Bayes, Linear regression, Data Analysis, Bokeh, CLT, SVM.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/REFERENCE BOOKS:

1. Rachel Schutt, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontiline" by Schroff/O'Reilly, 2013.
2. Foster Provost, Tom Fawcett, "Data Science for Business "What You Need to Know About Data Mining and Data-Analytic Thinking" by O'Reilly, 2013.
3. John W. Foreman, "DataSmart: Using data Science to Transform Information into Insight" by John Wiley & Sons, 2013.
4. Ian Ayres, "Super Crunchers: Why Thinking by Numbers Is the New Way to Be Smart" Ist Edition by Bantam, 2007.
5. Eric Seigel, "Predictive Analytics: The Power to Predict who Will Click, Buy, Lie, or Die", 1st Edition, by Wiley, 2013.
6. Baumer et al., Modern Data Science with R. CRC Press.
7. Grolemund and Wickham, R for Data Science. O'Reilly. [http://r4ds.had.co.nz/]
8. Chester Ismay and Albert Y. Kim, An Introduction to Statistical and Data Sciences via R. [http://moderndive.com/]
9. Peter Dalgaard, Introductory Statistics with R, Second Edition, Springer, New York, NY (ISBN: 978-0387790534).
10. Tukey, Data-Based Graphics: Visual Display in the Decades to Come. in Statist. Sci. [https://projecteuclid.org/journals/statistical-science/volume-5/issue-3/Data-Based-Graphics--Visual-Display-in-the-Decades-to/10.1214/ss/1177012101.full]
11. Gelman et al., Let's Practice What We Preach: Turning Tables into Graphs. in Statist. Sci. [http://www.stat.columbia.edu/~gelman/research/published/dodhia.pdf]
12. Yau, Data Points: Visualization That Means Something. Wiley. [eBook available at http://www.library.pitt.edu/]
13. Tufte, The visual display of quantitative information. Cheshire. [https://www.cs.unm.edu/~pgk/IVCDs14/minitufte.pdf]
14. Wickham, Hadley. "A layered grammar of graphics." Journal of Computational and Graphical Statistics 19.1 (2010) [http://vita.had.co.nz/papers/layered-grammar.pdf]

E-RESOURCES:

1. Introduction of Data Science: https://nptel.ac.in/courses/106106179
2. Essentials of Data Science with R Software: https://www.youtube.com/watch?v=ZmCBF5JXOPM&list=PLFW6lRTa1g80s2MWqXNg2o0haq1k14v2I
3. Data science/R topics from W3School: https://www.w3schools.com/datascience/
4. Data Science Math: https://www.w3schools.com/datascience/ds_linear_functions.asp
5. Data Science Statistics: https://www.w3schools.com/datascience/ds_stat_intro.asp
6. Data Science Advanced: https://www.w3schools.com/datascience/ds_linear_regression.asp
7. R Programming: https://www.w3schools.com/r/
8. Data science topics from Javatpoint: https://www.javatpoint.com/data-science

Part D: Assessment and Evaluation

Maximum Marks: 100 End Semester Examination(ESE): 75 Marks Internal Assessment(IA): 25 Marks	
Internal Assessment: **(i)** **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **I**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS102
2.	Course Title	**Artificial Intelligence & Machine Learning**
3.	Course Type	**Theory**
4.	Pre-requisite (if any)	A sound knowledge of basic mathematics concepts, statistics, linear algebra, programming languages, and data modelling
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand a wide variety of learning algorithms. • Understand how to evaluate models generated from data. • Apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models. • Apply ML algorithms in various domains. • Simulate real world problems using ML techniques. • Apply deep learning techniques for computer vision.
6.	Credit Value	4
7.	Total Marks	Max. Marks: 100 Min. Marks: 40

Part B: Content of the Course

Total Hours/Lectures: 60

Unit	Topics	No. of Lectures
I.	**Introduction:** Overview of Artificial Intelligence (AI), Foundations of A.I., History of AI, Areas and state of the art in A.I., Knowledge: Introduction, Knowledge Based system, Knowledge representation techniques.	12
II.	**Searching Techniques:** Problem solving as state space search, production system, control strategies and problem characteristics, Search techniques: Breadth First search, Depth-first search, Hill-climbing, Heuristics search, Best-First search, greedy method, A* algorithm.	12
III.	**Machine Learning:** What is Machine learning, Types of machine learning, Statistical learning: background and general methods, Bayesian network, decision trees, supervised learning: linear regression, artificial neural network, Back propagation network, support vector machine, radial basis function network, unsupervised learning: types of clustering, K-means clustering, hierarchical clustering, self organization map, reinforcement learning.	12
IV.	**Machine Learning Model:** Measuring classification accuracy, data preprocessing, feature selection and generation, dimensionality reduction: Principal component analysis (PCA), training, testing and validation data sets, ensemble methods: Bagging and boosting.	12

V.	**Application of ML and Deep Learning:** Applying ML to solve real world problems in various domains like financial forecasting, classification problems, clustering, Natural language processing (NLP), health care, image classification etc. Introduction to deep learning, Convolutional Neural Network (CNN), Long Short Term Memory (LSTM), solving computer vision and other problems through deep learning techniques.	12

Keywords: Searching Technique, Supervised Learning, Unsupervised Learning, Classification Technique, Natural Language Processing (NLP), Artificial Intelligence (AI), Machine Learning (ML), Deep Learning.

Part C - Learning Resources
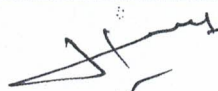
Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. Artificial Intelligence and machine learning, Vinod Chandra S.S., Anand Hareendrn S., PHI learning private Ltd.
2. Introduction to Artificial Intelligence and Expert Systems, Dan W. Patterson, PHI Publication.
3. Artificial Intelligence, Elaine Rich and Kevin Knight TMH publication.
4. Machine learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley publication, India , 2019 edition.
5. Introduction to Machine Learning with python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly.
6. Understanding machine learning: From theory to algorithms, shai shalev-shwartez, shai ben-david, Cambridge University press.
7. Machine learning with python, Abhishek Vijayvargia, BPB publication.
8. Machine learning using python, U Dinesh Kumar, Manaranjan Pradhan, Wiley publication.
9. Deep learning, Ian Goodfellow , Yoshua Bengio, Aoran Courville, Adaptive computation and machine learning series.
10. Machine learning, Tom M. Mitchell, McGraw Hill, Indian Edition.

E-RESOURCES:

1. Overview of Machine Learning:
   https://www.youtube.com/watch?v=whSKA8aO6xQ&list=PLyqSpQzTE6M-SISTunGRBRiZk7opYBf_K&index=3
2. Introduction to Artificial Intelligence:
   https://www.youtube.com/watch?v=pKeVMlkFpRc&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=2
3. Problem Solving as State Space Search:
   https://www.youtube.com/watch?v=fLw8SfvaJWA&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=3
4. Uninformed Search:
   https://www.youtube.com/watch?v=te1K8on1Pk0&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=4
5. Heuristic Search:
   https://www.youtube.com/watch?v=0awSpFyh2MY&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHc

H&index=5

6. Informed Search:
   https://www.youtube.com/watch?v=-Rf2hOyjZB8&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSHcH&index=6
7. http://www.jnit.org/wp-content/uploads/2020/04/Machine-Learning-Lab-Manual.pdf
8. http://www.hpc.iitkgp.ac.in/pdfs/AI_HPC.pdf
9. https://nthu-datalab.github.io/ml/
10. https://www.jnec.org/labmanuals/cse/te/sem1/Machine%20Learning%20LAB%20MANUAL%20(1).pdf
11. https://deepakdvallur.weebly.com/machine-learning-laboratory.html
12. https://www.tensorflow.org/resources/learn-ml?gclid=CjwKCAjw_ISWBhBkEiwAdqxb9hljIi5hnqF0Cq2Fgy_JEWiD_uZbxtetr_BFUF_QztAELk8d2q3P_BoCodMQAvD_BwE
13. https://copyassignment.com/machine-learning-a-gentle-introduction/

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment:	
(i) **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **I**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS104
2.	Course Title	**Lab-1: Python Programming**
3.	Course Type	**Practical**
4.	Pre-requisite (if any)	Theoretical knowledge of Python
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: - Learn the Numbers, Math functions, Strings, List in Python. - Learn the tuples and dictionaries in Python. - Demonstrate proficiency in handling of loops and creation of functions. - Identify the methods to create and manipulate lists, tuples and dictionaries. - Express different Decision Making statements and Functions.
6.	**Credit Value**	2
7.	**Total Marks**	**Max. Marks: 100** **Min. Marks: 40**

Part B: Content of the Course

Total Lectures: 30 /Total Hours:60

Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement.

1. Python program to find the union of two lists.
2. Python program to find the intersection of two lists.
3. Using for loop, print a table of Celsius/Fahrenheit equivalences. Let c be the Celsius temperatures ranging from 0 to 100, for each value of c, print the corresponding Fahrenheit temperature.
4. Using while loop, produce a table of sins, cosines and tangents. Make a variable x in range from 0 to 10 in steps of 0.2. For each value of x, print the value of sin(x), cos(x) and tan(x).
5. Write a program that reads an integer value and prints —leap year‖ or —not a leap year‖.
6. Write a program that takes a positive integer n and then produces n lines of output shown as follows.
   For example, enter a size: 5
   ```
   *
   **
   ***
   ****
   *****
   ```
7. Write a function that takes an integer _n'as input and calculates the value of $1 + 1/1! + 1/2! + 1/3! + \ldots + 1/n$
8. Write a function that takes an integer input and calculates the factorial of that number.
9. Write a function that takes a string input and checks if it's a palindrome or not.
10. Write a list function to convert a string into a list, as in list (_abc') gives [a, b, c].
11. Write a program to generate Fibonacci series.

12. Write a program to check whether the input number is even or odd.
13. Write a program to compare three numbers and print the largest one.
14. Write a program to print factors of a given number.
15. Write a method to calculate GCD of two numbers.
16. Write a program to create Stack Class and implement all its methods. (Use Lists).
17. Write a program to create Queue Class and implement all its methods. (Use Lists)
18. Write a program to implement linear and binary search on lists.
19. Write a program to sort a list using insertion sort and bubble sort.
20. Python program to remove the "i" th occurrence of the given word in a list where words repeat.
21. Python program to count the occurrences of each word in a given string sentence.
22. Python program to check if a substring is present in a given string.
23. Python program to map two lists into a dictionary.
24. Python program to count the frequency of words appearing in a string using a dictionary.
25. Python program to create a dictionary with key as first character and value as words starting with that character.
26. Python program to find the length of a list using recursion.
27. Python program to read a file and capitalize the first letter of every word in the file.
28. Python program to read the contents of a file in reverse order.
29. Python program to create a class in which one method accepts a string from the user and another prints it.
30. Study and Implementation of Database, Structured Query Language and database connectivity.

Part C - Learning Resources
Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011.
2. Allen Downey, Jeffrey Elkner, Chris Meyers, How to think like a computer scientist: Learning with Python, 2012.
3. Mark Lutz, Learning Python.
4. Tony Gaddis, Starting Out With Python.
5. Kenneth A. Lambert, Fundamentals of Python.
6. James Payne, Beginning Python using Python 2.6 and Python 3.

E-RESOURCES:

1. https://siiet.ac.in/wp-content/uploads/2020/02/PP-LAB-MANUAL-IV-CSE-I-SEM.pdf
2. https://www.jnec.org/labmanuals/cse/se/sem1/Python%20SY%20BTech%20Lab%20Manual.pdf
3. https://mrcet.com/pdf/Lab%20Manuals/CSE/(R18A0588)%20Python%20Programming%20%20Lab%20Manual.pdf
4. https://www.cdlsiet.ac.in/wp-content/uploads/2022/03/PYTHON-Lab-Manual.pdf
5. https://kgr.ac.in/storage/2021/08/PYTHON-LAB-MANUAL.pdf
6. http://iotmumbai.bharatividyapeeth.edu/media/pdf/lab_manuals/Manual_CM6I_PWP_22616_120421.pdf

7. http://www.jnit.org/wp-content/uploads/2020/04/Python-Lab-Manual-converted.pdf
8. https://www.mrecacademics.com/DepartmentStudyMaterials/20201223-python%20programming%20lab%20manual.pdf
9. https://www.lendi.org/CSE/labmanuals/PP.pdf
10. https://www.jnec.org/labmanuals/cse/te/sem1/Machine%20Learning%20LAB%20MANUAL%20(1).pdf

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment:	
(i) **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. (ii) **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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Date: 16.03.2022

<table>
<tr><td colspan="5" align="center">Part A: Introduction</td></tr>
</table>

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **I**		w.e.f. Academic Session: **2022-23**
1.	Course Code		MTCS105	
2.	Course Title		**Research Methodology and IPR**	
3.	Course Type		**Theory**	
4.	Pre-requisite (if any)		No	
5.	Course Learning. Outcomes (CLO)		At the end of this course, the students will be able to: - Understand research problem formulation. - Analyze research related information. - Follow research ethics. - Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property. - Right to be promoted among students in general & engineering in particular. - Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits. - Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.	
6.	**Credit Value**		**2**	
7.	**Total Marks**	**Max. Marks: 50**		**Min. Marks: 20**

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<table>
<tr><td colspan="3" align="center">Part B: Content of the Course</td></tr>
<tr><td colspan="3" align="center">Total Hours/Lectures: 30</td></tr>
</table>

Unit	Topics	No. of Lectures
I.	**Introduction and Design of research:** Meaning, objectives and significance of research, research process, identification and definition of the research problem. Steps in research, Review of literature, research gape, Quantitative and qualitative research, Criteria of good research, Paper writing, layout of research paper.	6
II.	**Research Software: MATLAB-** Basics of MATLAB, creating variable, MATLAB function, Data types, Arrays, plotting graph, Input and output statements, conditional statement, Exploring tools: NN tools, optimization tool, statistical tool, Machine learning, Simulink etc. **WEKA:** What is?, launching explorer, loading data, data preprocessing, classifier, clustering, association and feature selection etc. **SPSS Modeler:** Data preparation, data understanding, evaluation and analysis. Modeling etc.	
III.	**Research ethics:** Definition, moral philosophy, nature of moral judgments and reactions, **Scientific misconduct:** Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific misconducts: Falsification,	6

	Fabrication, and Plagiarism (FFP), **Publication ethics:** Best practices, Conflicts of interest, Publication misconduct, Publication misconduct, violation of publication ethics.	
IV.	**Indexing Databases:** Indexing databases, Citation databases: Web of Science, Scopus, etc., Use of plagiarism software like Turnitin, Urkund/ Ouriginal and other open source software. **Research Metrics:** Impact Factor of journal as per Journal Citation Report (JCR), pear review process, h-index, g-index, i10-index. **Journal and thesis:** Referred journal, Indexed journal, open access journal, open access policy, SCIE and ESCI journals, Science direct, Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc., UGC care journal, Peer review process. Sodhganga, E-Sodh Sindhu.	6
V.	**Intellectual Property Right:** Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property, Procedure for grants of patents, Patenting under PCT. **Patent Rights:** Scope, Licensing and transfer of technology, Patent information and databases. Geographical Indications, Administration of Patent System, IPR of computer software, Case studies.	6

Keywords: Research Methodology, Qualitative Research, Quantitative Research, Research tool, Intellectual property right, Journal, Research ethics, Plagiarism.

Part C - Learning Resources
Text Books, Reference Books and E-Resources

TEXT/REFERENCE BOOKS:
1. Research in education, By J W Best and J V Kahn, Pearson/ Allyn and Bacon.
2. Research Methodology – Methods and Techniques, C K Kothari, New Age International.
3. Design and Analysis of Experiments, D C Montgomery, Wiley.
4. Applied Statistics & Probability for Engineers, D C Montgomery & G C Runger, Wiley.
5. Management Research Methodology: Integration of Principles, Methods and Techniques, K N Krishnaswamy, A I Sivakumar and M Mathiranjan, Pearson Education.
6. Research methodology: an introduction for science & engineering students, Stuart Melville and Wayne Goddard.
7. Research Methodology: An Introduction, Wayne Goddard and Stuart Melville.
8. Research Methodology: A Step by Step Guide for beginners, Ranjit Kumar, 2nd Edition.
9. Resisting Intellectual Property, Halbert, Taylor & Francis Ltd,2007.
10. Industrial Design, Mayall, McGraw Hill, 1992.
11. Product Design, Niebel, McGraw Hill, 1974.
12. Introduction to Design, Asimov, Prentice Hall, 1962.
13. Intellectual Property in New Technological Age, Robert P. Merges, Peter S. Menell, Mark A. Lemley, 2016.
14. Intellectual Property Rights Under WTO, T. Ramappa, S. Chand, 2008.
15. Research Methodology: A Step by Step Guide for beginners, Ranjit Kumar, 2nd Edition.
16. Resisting Intellectual Property, Halbert, Taylor & Francis Ltd ,2007.
17. Industrial Design, Mayall, McGraw Hill, 1992.
18. Product Design, Niebel, McGraw Hill, 1974.
19. Introduction to Design, Asimov, Prentice Hall, 1962.
20. Intellectual Property in New Technological Age, Robert P. Merges, Peter S. Menell, Mark A.

Lemley 2016.
21. Intellectual Property Rights Under WTO, T. Rámappa, S. Chand, 2008

E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc22_ge08/preview
2. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc19_ge21/preview
3. Coursera: https://www.coursera.org/courses?query=intellectual%20property
4. Coursera: https://www.coursera.org/specializations/introduction-intellectual-property
5. Coursera:https://www.coursera.org/lecture/being-researcher/introduction-to-research-methodology-kf6rq
6. https://www.bachelorprint.eu/research/research-methodology/
7. https://www.researchgate.net/publication/342467021_Research_Methodology_Tutorial-_Dr_Abhijit_Mitra_presents_-
8. https://www.tutorialspoint.com/fundamentals-of-research-methodology/index.asp
9. https://www.slideshare.net/anilkumarkhadka/research-methodology-notes

Part D: Assessment and Evaluation

Maximum Marks: 50
End Semester Examination(ESE): 32 Marks
Internal Assessment(IA): 18 Marks
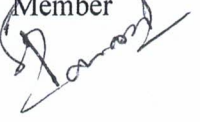
Internal Assessment:	
(i) **Unit test (10 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (8 Marks)**	**Total:** 18 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **I**		w.e.f. Academic Session: **2022-23**

1.	Course Code	**MTCS106**
2.	Course Title	**Cloud Computing**
3.	Course Type	**Theory**
4.	Pre-requisite (if any)	A sound knowledge of networking and operating system
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Identify the appropriate cloud services for a given application. • Assess the comparative advantages and disadvantages of Virtualization technology. • Analyze authentication, confidentiality and privacy issues in cloud computing. • Identify security implications in cloud computing. • Understand the importance of protocols and standards in management for cloud services.
6.	**Credit Value**	**4**
7.	**Total Marks**	**Max. Marks: 100** **Min. Marks: 40**

Part B: Content of the Course

Total Hours/Lectures: 60

Unit	Topics	No. of Lectures
I.	**Introduction to Cloud Computing**: What is a cloud, Definition of Cloud Computing, Characteristics of Cloud Computing, Driving factors towards cloud, Architecture, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services, Service Models: IaaS, PaaS, SaaS, NaaS, Cloud Clients, Deployment Models: Public Clouds, Community Clouds, Hybrid Cloud, Private Cloud, Issues in Cloud Computing, Applications.	12
II.	**Infrastructure as a Service(IaaS)**: IaaS definition, Introduction to virtualization, Different approaches to virtualization, Resource Virtualization- Server, Storage, Network, Hypervisors, Machine Image, Virtual Machine(VM), Data storage in cloud computing(storage as a service), Examples like Amazon EC2-Renting, EC2 Compute Unit, Platform and Storage, pricing, customers.	12
III.	**Platform as a Service(PaaS)**: What is PaaS, Service Oriented Architecture (SOA), Cloud Platform and Management, Examples like Google App Engine.	12
IV.	**Software as a Service(SaaS):** Introduction to SaaS, Web services, Web 2.0	12
V.	**Overview of Security**: Issues, Infrastructure Security: Network level security, Host level security, Application level security, Data security and Storage, Challenges and Risks of Cloud Computing Platforms and Cloud Services.	12

Keywords: Cloud Computing, Security, Storage, Virtualization, Virtual appliances, Hypervisors.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/REFERENCE BOOKS:

1. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, McGraw Hill Education.
2. Barrie Sosinsky, "Cloud Computing Bible", Wiley India Edition.
3. Anthony Velte, tobyVelte, Robert Elsenpeter, "Cloud Computing – A Practical Approach", Tata McGraw-Hill Edition.
4. Cloud Computing:Black Book, Kailash Jayaswal et al., Kogent Learning Solutions, Dreamtech Press.
5. Cloud Computing: Principals and Paradigms,RajkumarBuyya et al., Wiley India.
6. Cloud Computing: Concepts, Technology & Architecture,Erl, Pearson Education India.
7. Cloud Computing Bible, Barrie Sosinsky, O'Reilly Media.
8. Cloud Computing: A Practical Approach, Toby Velte, Anthony Vote and Robert Elsenpeter, McGraw Hill.
9. Cloud Application Architectures: Building Applications and Infrastructures in the Cloud, George Reese, O'Reilly Media.

E-RESOURCES:
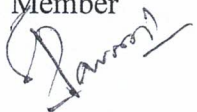
1. Coursera: https://www.coursera.org/courses?query=computing
2. Introduction to Cloud Computing from W3shool: https://www.w3schools.in/cloud-computing/tutorials/
3. Introduction to Cloud Computing from Coursera: https://www.coursera.org/learn/introduction-to-cloud
4. Cloud Computing Basics: https://www.coursera.org/learn/cloud-computing-basics
5. Cloud Computing Concepts: https://www.coursera.org/learn/cloud-computing
6. Cloud Computing Specialization from Coursera: https://www.coursera.org/specializations/cloud-computing
7. Cloud Computing from SWAYAM/NPTEL
   https://onlinecourses.nptel.ac.in/noc22_cs20/preview
   https://www.youtube.com/channel/UCK73enkjfQNDwdBqMyaMtRg
8. https://annauniversityedu.blogspot.com/2020/10/cs8711-cloud-computing-laboratory.html
9. https://drive.google.com/file/d/1oiuQYwkgFXy4R45l8us4ynnXNFqx6OkW/view
10. https://www.vidyarthiplus.com/vp/attachment.php?aid=53342
11. https://www.iare.ac.in/sites/default/files/lab1/CAD%20LAB%20UPDATED%20BY%20ANJAIAH-%20FINAL_0.pdf
12. https://jainakshay781.files.wordpress.com/2019/02/final-cc-lp-iv-manual-1.pdf
13. http://www.gpcet.ac.in/wp-content/uploads/2018/08/GCC-LAB-MANUAL.pdf
14. https://shanpnk.weebly.com/uploads/5/8/9/4/58948709/gcclab-courseware-labmanual.pdf
15. https://www.bharathuniv.ac.in/downloads/csc/BCS7L1%20-Grid%20&%20Cloud%20Computing%20lab.pdf

Part D: Assessment and Evaluation

Maximum Marks: 100 End Semester Examination(ESE): 75 Marks Internal Assessment(IA): 25 Marks	
Internal Assessment: **(i)** **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **I**		w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS107	
2.	Course Title	**Soft Computing**	
3.	Course Type	**Theory**	
4.	Pre-requisite (if any)	Proficiency with algorithms and programming skills in python, MATLAB etc.	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: - Analyze and appreciate the applications which can use fuzzy logic. - Understand the difference between learning and programming and explore practical applications of Neural Networks (NN). - Students would understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications - Ability to appreciate the importance of optimizations and its use in computer engineering fields and other domains. - To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.	
6.	Credit Value	4	
7.	**Total Marks**	**Max. Marks: 100**	**Min. Marks: 40**

Part B: Content of the Course

Total Hours/Lectures: 60

Unit	Topics	No. of Lectures
I.	**Introduction:** What is soft computing? Different tools of soft computing and its comparison, Area of application.	12
II.	**Artificial Neural Network (ANN):** Architecture, Introduction, Evolution of Neural Network, Biological Neural Network vs ANN, Basic Model of ANN, Different types of ANN, Single layer Perceptron, Solving XOR problem, Activation function, Linear severability, Supervised and unsupervised learning, perceptron learning, delta learning, Feed-forward and Feedback networks, Error Back Propagation Network (EBPN), Associative memories and its types, Hopefield Network, Kohenenself-organizing Map.	12
III.	**Fuzzy Logic:** Introduction to Classical Sets and Fuzzy Sets, Membership Function, properties and operations of classical set and Fuzzy set, a-cuts, Properties of a-cuts, Linguistic Variables, Membership function, Classical relation and Fuzzy Relation and its properties and operations, Defuzzification and its methods, Fuzzy rule base.	12
IV.	**Genetic Algorithm:** What is Optimization?, Introduction, Application, GA operators: selection, crossover and mutation ,different techniques of selection, crossover and mutation, different types of chromosomes, Application of GA.	12

V.	**Hybrid Soft Computing:** Design of Neuro-Fuzzy model like ANFIS, Neuro-Genetic, Fuzzy-Genetic Neuro-Fuzzy-Genetic model, MATLAB environment for soft computing.	12

Keywords: Soft computing, Artificial Neural Network (ANN), Fuzzy Logic, Genetic Algorithm.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/REFERENCE BOOKS:

1. Principles of soft computing , S.N. Shivanandan and S.N Deepa , Wiley publication, Wiley India Edition.
2. Neural network and Learning Machines, Simon Haykin, Pearson Education, 2011.
3. Artificial Neural Networks, Robert J. Scholkoff, McGraw Hill Education(India) Pvt. Limited,1997.
4. Neural Networks and Fuzzy Systems, A dynamical Systems Approach to Machine Learning, Bart Kosko, PHI learning private limited.
5. Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, S. Rakasekaran, G.A. VijayalakshmiPai, PHI learning private limited, 14th Edition. 2003.
6. Neural Networks and Fuzzy Logic, K. Vinoth Kumar, R. Saravana Kumar, S. K. Kataraia and Sons publication.
7. Artificial Neural Networks, B.Yegnanarayana Prentice Halll of India (P) Limited.
8. Introduction to Artificial Neural Systems, Jacek M. Zurada, Jaico Publication House.
9. Fuzzy Sets, Uncertainty and Information, G. J. Klir and T.A. Folger, PHI learning private limited. Publisher– Pearson 3Edition 1999.

E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs17/preview
2. https://www.javatpoint.com/what-is-soft-computing
3. https://www.geeksforgeeks.org/need-for-soft-computing/
4. https://www.tutorialspoint.com/fuzzy_logic/index.htm
5. https://www.slideshare.net/ganeshpaul6/soft-computing-14879490
6. https://www.iare.ac.in/sites/default/files/lab1/IARE_SOFT_COMPUTING_LAB_MANUAL.pdf
7. https://coeosmanabad.ac.in/wp-content/uploads/2020/03/SC-LAB-MANUAL-2017-18.pdf
8. http://ggn.dronacharya.info/Mtech_CSE/Downloads/Labmanuals/Mtech/Lab_Manual_Soft_Computing%20_MTCE-612-A.pdf
9. https://www.slideshare.net/vivekkumarsinha35/cse-7-softcomputing-lab
10. https://annamalaiuniversity.ac.in/studport/download/CSE_Engg/Lab_Manual/08CP706_Soft_Computing_Techniques_Lab.pdf
11. https://mu.ac.in/wp-content/uploads/2021/07/M.Sc.IT-Part-I-Semester-I-Soft-Computing-1-2.pdf
12. http://vlabs.iitkgp.ernet.in/scte/index.html
13. http://vlabs.iitkgp.ac.in/vlt/project.html#

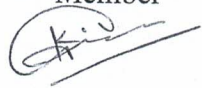| Part D: Assessment and Evaluation	
Maximum Marks: 100 End Semester Examination(ESE): 75 Marks Internal Assessment(IA): 25 Marks	
Internal Assessment: **(i)** **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**		Semester: **I**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS108	
2.	Course Title	**Block Chain Technology**	
3.	Course Type	**Theory**	
4.	Pre-requisite (if any)	A sound knowledge of data structure and programming	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand and explore the working of Blockchain technology. • Analyze the working of Smart Contracts. • Understand and analyze the working of Hyperledger. • Apply the learning of solidity and de-centralized apps on Ethereum.	
6.	**Credit Value**	**4**	
7.	**Total Marks**	**Max. Marks: 100**	**Min. Marks: 40**

Part B: Content of the Course

Total Hours/Lectures: 60

Unit	Topics	No. of Lectures
I.	**Introduction of Cryptography and Blockchain:** What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.	12
II.	**BitCoin and Cryptocurrency:** What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain And Digital Currency, Transactional Blocks, Impact Of Blockchain Technology On Cryptocurrency.	12
III.	**Introduction to Ethereum:** What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, How Smart Contracts Work, Metamask Setup, Ethereum Accounts, Receiving Ether's What's a Transaction?, Smart Contracts. Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts.	12
IV.	**Introduction to Hyperledger:** What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer.	12
V.	**Block chain Applications:** Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.	12

Keywords: Blockchain. Hyperledger. Cryptocurrency. Smart Contract. Ethereum. Alt Coins.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin. and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
2. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies.
3. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System.
4. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
5. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts.
6. Melanie Swan, Blockchain: Blueprint for a New Economy.
7. Imran Bashier, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks.
8. Andrews, Mastering Ethereum: Building Smart Contracts and DApps.

E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.swayam2.ac.in/aic21_ge01/preview
2. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs01/preview
3. edX: https://www.edx.org/course/blockchain-technology
4. Coursera: https://www.coursera.org/search?query=Blockchain&
5. Hyperledger Fabric: https://www.youtube.com/watch?v=GWoN9TwbM20
6. Case studies of Blockchain: https://www.youtube.com/watch?v=GTExtIjlE7I
7. https://www.youtube.com/watch?v=fhWjGs-2PLE&list=PLkkt2qQlhbKYLQ1fFKXHmw64QfC9bRz2G
8. https://iabtechlab.com/wp-content/uploads/2018/07/Blockchain-Technology-Primer.pdf
9. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SITA1301.pdf
10. https://www.guru99.com/blockchain-tutorial.html
11. https://www.tutorialspoint.com/blockchain/index.htm
12. https://www.javatpoint.com/blockchain-tutorial
13. https://www.simplilearn.com/tutorials/blockchain-tutorial
14. https://www.edureka.co/blog/blockchain-tutorial/
15. https://www.simplilearn.com/tutorials/blockchain-tutorial/how-to-become-a-blockchain-developer
16. https://www.edureka.co/blog/blockchain-tutorial/

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment:	
(i) **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered.	**Total:** 25 Marks
(ii) **Presentation/Assignment (10 Marks)**	

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**		Semester: **I**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS109
2.	Course Title	MOOC/ Workshop/Conference etc.
3.	Course Type	**Practical**
4.	Pre-requisite (if any)	Not required
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Join and explore MOOC courses from reputed platforms. • Enhance knowledge on latest techniques. • Make ready for IT industry. • Up skill knowledge. • Present paper in conference. • Enhance knowledge through the workshop.
6.	**Credit Value**	**2**
7.	**Total Marks**	**Max. Marks: 50** **Min. Marks: 20**

Part B: Important Guidelines

Total Hours: 60

1. Student has to complete at least one MOOC course.
2. Student should register for any MOOC course from SWAYAM/NPTEL/Coursera/Edx etc. or as notified by the department from time to time under the guidance of mentor and certificate of completion must be submitted in the department.
3. MOOC courses will be notified at the beginning of each semester and student has to opt from the list only.
4. Student not able to enroll or complete MOOC course due to any valid reasons shall be assigned similar task by the HOD/Mentor as an alternative option.
5. At the end of the semester student has to present his/her work in front of internal/Mentor.
6. Student can join workshop or can present research paper in national or international level conference.
7. Student has to take prior approval of MOOC.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

NA

Part D: Assessment and Evaluation

Maximum Marks: 50
Internal Assessment (IA):50 Marks

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Date: 16.03.2022

Part A: Introduction				
Program: **Master Degree**	Class: **M.Tech.(CS) I Year**		Semester: **II**	w.e.f. Academic Session: **2022-23**
1.	Course Code		MTCS201	
2.	Course Title		**Cryptography and Network Security**	
3.	Course Type		**Theory**	
4.	Pre-requisite (if any)		Basic knowledge of networking and algorithms	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Classify the symmetric encryption techniques. • Illustrate various Public key cryptographic techniques. • Evaluate the authentication and hash algorithms. • Summarize the intrusion detection and its solutions to overcome the attacks. • Basic concepts of system level security.			
6.	**Credit Value**		4	
7.	**Total Marks**	**Max. Marks: 100**		**Min. Marks: 40**

Part B: Content of the Course		
Total Hours/Lectures: 60		
Unit	**Topics**	**No. of Lectures**
I.	**Classical Encryption Technique:** Basics of computer network, TCP/IP model, Foundations of Cryptography and security trends, Secret key vs public key cryptography, Symmetric cipher model, substitution techniques, Transportation techniques, Mathematical tools for cryptography: modular arithmetic, Euclidean algorithm, finite fields, polynomial arithmetic.	12
II.	**Symmetric cipher:** Symmetric cipher model, Traditional block cipher: Stream and block cipher, Feistel cipher network structure, Design Principles of Block Ciphers, Data Encryption Standard (DES), Strength of DES Triple DES, Block cipher design principal, Block cipher operation, Advance encryption Standard (AES), Evaluation criteria of AES, AES transformation function, key distribution.	12
III.	**Public Key cryptography and Hash Function:** Principles of public key cryptosystem, requirement, RSA algorithm. Hash function, Key management: Diffie-Helman Key exchange, Man in the middle attack, elliptic curve arithmetic, elliptic curve cryptography, Application of cryptographic hash function, Hash and Message authentication Code (MAC), Hash and MAC algorithms, MAC based on hash function, Digital signature and Authentication protocol. Key management and distribution: Distribution of symmetric key and public key, Public key Infrastructure (PKI).	12
IV.	**IP and Web security protocols:** User authentication: principle, Remote user authentication using symmetric and asymmetric encryption, Kerberos, E-mail security: Pretty Good Privacy (PGP), S/MIME, IP security: IPsec, transport layer Security: Secure Socket layer (SSL), Secure Electronic Transaction (SET).	12

V.	**Network Security and Management:** Principles of cryptography, Authentication, integrity, key distribution and certification, Access control and Firewalls, attacks and counter measures, security in many layers. Infrastructure for network management, The internet standard management framework, SMI, MIB, SNMP, Security and administration.	12

Keywords: Symmetric Cipher, Hash, Message Authentication Code (MAC), Public key, Private key, Secure Socket Layer (SSL), Secure Electronic Transaction (SET).

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. Cryptography and Network Security, William Stallings, 4th Edition Pearson Publication.
2. Network security and cryptography, Bernard Menezes, Cenage Learning India Pvt. Ltd. First edition 2010.
3. Applied cryptography - protocols and algorithm, Buce Schneier, Springer Verlag 2003.
4. Cryptography and Network Security, Atul Kahate , TMH Publication.
5. Cryptography and Network Security, Behrouz A. Forouzan, First Edition, TMH Publication.
6. Network Security: Private Communication in Public World By Charlie Kaufman ,Radia Perlman and Mike Speciner, PHI Publication.

E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs21/preview
2. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs02/preview
3. Coursera: https://www.coursera.org/search?query=Cryptography
4. Coursera: https://www.coursera.org/search?query=network%20sequrity&
5. https://www.gatevidyalay.com/tag/cryptography-and-network-security-tutorial/
6. https://www.javatpoint.com/computer-network-security
7. https://www.geeksforgeeks.org/cryptography-introduction/
8. https://www.tutorialspoint.com/cryptography/index.htm
9. https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf
10. http://www.anuraghyd.ac.in/cse/wp-content/uploads/sites/10/NS-CRYPTO-LAB-Final11.pdf
11. https://www.vvitengineering.com/lab/odd/CS6711-Security-Lab-Manual.pdf
12. https://www.vidyarthiplus.com/vp/attachment.php?aid=53300
13. https://kgr.ac.in/storage/2021/08/CNS-LAB-Manual.pdf

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment:	
(i) **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered.	**Total:** 25 Marks
(ii) **Presentation/Assignment (10 Marks)**	

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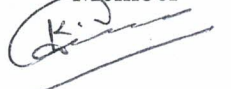   C.M. Dubey P.G. College, Bilaspur(C.G.)

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Date: 16.03.2022

Part A: Introduction				
Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **II**	w.e.f. Academic Session: **2022-23**	
1.	Course Code	MTCS-203		
2.	Course Title	**Big Data Analytics**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	A sound knowledge of Database Management System		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand fundamentals of Big Data analytics. Investigate Hadoop framework and Hadoop Distributed File system. • Demonstrate the Map Reduce programming model to process the big data along with Hadoop tools. • Analyze web contents and Social Networks to provide analytics with relevant visualization tools. • Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.		
6.	**Credit Value**	**4**		
7.	**Total Marks**	**Max. Marks: 100**	**Min. Marks: 40**	

Part B: Content of the Course	
Total Hours/Lectures: 60	

Unit	Topics	No. of Lectures
I.	**Introduction to Big Data**: Introduction– distributed file system–Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce Big Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce -, Data Serialization.	12
II.	**HDFS, HIVE, HIVEQL and HBASE:** HDFS-Overview, Installation and Shell, Java API; Hive Architecture, Comparison with Traditional Database, HiveQLQuerying Data, Sorting And Aggregating, Map Reduce Scripts, Joins& Sub queries, HBase concepts, Advanced Usage, Schema Design,Advance Indexing, PIG, Zookeeper , how it helps in monitoring acluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.	12
III.	**SPARK:** Introduction to Data Analysis with Spark, Downloading Sparkand Getting Started, Programming with RDDs.	12
IV.	**YARN:** Introduction to YARN, YARN Framework, Classic Map Reduce Vs YARN, Schedulers: FIFO, Fair, Capacity.	12
V.	**NoSQL:** What is it?, Where It is Used Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL.	12
Keywords: Big Data, Hadoop, Mapreduce, YARN, Spark, Hive, Hbase, Pig, Sqoop, Oozie, NoSQL.		
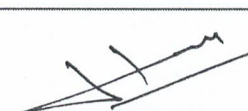
Part C - **Learning Resources**

Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. "Professional Hadoop Solutions", Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, Wiley, 2015.
2. "Understanding Big data", Chris Eaton, Dirk deroos et al., McGraw Hill, 2012.
3. "HADOOP: The definitive Guide" , Tom White, O Reilly 2012.
4. "Big Data Analytics with R and Haoop", VigneshPrajapati, Packet Publishing 2013.
5. "Oracle Big Data Handbook", Tom Plunkett, Brian Macdonald et al , Oracle Press, 2014.
6. "Big Data and Business analytics", JyLiebowitz, CRC press, 2013.

E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs92/preview
2. Swayam/NPTEL: https://onlinecourses.swayam2.ac.in/arp19_ap60/preview
3. Coursera: https://www.coursera.org/search?query=big%20data%20analytics
4. https://www.edureka.co/blog/big-data-tutorial
5. https://www.guru99.com/bigdata-tutorials.html
6. https://www.softwaretestinghelp.com/big-data-tutorial/
7. https://www.javatpoint.com/what-is-big-data
8. https://data-flair.training/blogs/big-data-tutorials-home/
9. https://www.simplilearn.com/tutorials/big-data-tutorial
10. https://www.tutorialspoint.com/big_data_tutorials.htm
11. http://deccancollege.ac.in/MCALABMANUALS/BIGDATALABMANUAL.pdf
12. https://www.iare.ac.in/sites/default/files/lab1/IARE_BIGDATA_LAB_MANUAL.pdf
13. https://www.studocu.com/in/document/gujarat-technological-university/big-data-analytics/big-data-analytics-2180710-lab-manual/18844373
14. https://usermanual.wiki/Document/CP5261202020DATA20ANALYTICS20LABORATORY20MANUAL20ME20CSE.1885205982/help
15. https://sites.google.com/site/vsat2k/beit_bda

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment:	
(i) **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered.	**Total:** 25 Marks
(ii) **Presentation/Assignment (10 Marks)**	

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Date: 16.03.2022

Part A: Introduction				
Program: **Master Degree**	Class: **M. Tech. (CS) I Year**		Semester: **II**	w.e.f. Academic Session: **2022-23**
1.	Course Code	MTCS202		
2.	Course Title	**Deep Learning**		
3.	Course Type	**Theory**		
4.	Pre-requisite (if any)	Basic knowledge of AI & ML concepts		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the concepts of Neural Networks. • Select the Learning Networks in modeling real world systems. • Use an efficient algorithm for Deep Models. • Apply optimization strategies for large scale applications.		
6.	**Credit Value**	**4**		
7.	**Total Marks**	**Max. Marks: 100**		**Min. Marks: 40**

Part B: Content of the Course		
Total Hours/Lectures: 60		
Unit	**Topics**	**No. of Lectures**
I.	**Basics:** Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm. **Feed forward Networks:** Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.	12
II.	**Deep Neural Networks:** Difficulty of training deep neural networks, Greedy layerwise training. **Better Training of Neural Networks:** Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).	12
III.	**Recurrent Neural Networks:** Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs. **Convolutional Neural Networks:** Pre-trained CNN models like LeNet, AlexNet etc.	12
IV.	**Generative models:** Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines. **Recent trends:** Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning.	12
V.	**Applications:** Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.	12
Keywords: Deep learning, Linear perceptron, Feed forward network, Autoencoders, Adversarial Network.		

Part C - Learning Resources

Text Books, Reference Books, Other Resources

TEXT/ REFERENCE BOOKS:

1. Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press.
2. Li Deng and Dong Yu. Deep Leaming Methods and Applications. Foundations and Trends in Signal Processing Volume 7 Issues 3-4, ISSN: 1932-8346.
3. Dr. N.D. Lewis, Deep Learning Made Easy with RA Gentle Introduction for Data Science. Create Space Independent Publishing Platform (January 10, 2016).
4. François Chollet, JJ Allaire. MEAP Edition Manning Early Access Program Deep Learning w Version 1, Copyright 2017 Manning Publications.

E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs11/preview
2. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs50/preview
3. Coursera: https://www.coursera.org/search?query=deep%20learning
4. https://www.kaggle.com/learn/intro-to-deep-learning
5. https://www.kaggle.com/code/kanncaa1/deep-learning-tutorial-for-beginners/notebook
6. https://www.tensorflow.org/resources/learn-ml?gclid=CjwKCAjw_ISWBhBkEiwAdqxb9hljIi5hnqF0Cq2Fgy_JEWiD_uZbxtetr_BFUF_Qzt AELk8d2q3P_BoCodMQAvD_BwE
7. https://www.manning.com/books/deep-learning-with-javascript
8. https://www.datacamp.com/tutorial/tutorial-deep-learning-tutorial
9. https://www.javatpoint.com/deep-learning
10. https://www.tutorialspoint.com/python_deep_learning/index.htm
11. https://www.simplilearn.com/tutorials/deep-learning-tutorial
12. https://www.guru99.com/deep-learning-tutorial.html
13. http://deeplearning.stanford.edu/tutorial/
14. http://paulorauber.com/slides/deep_learning_lab.pdf
15. http://www.jnit.org/wp-content/uploads/2020/04/Machine-Learning-Lab-Manual.pdf
16. http://www.hpc.iitkgp.ac.in/pdfs/AI_HPC.pdf
17. https://nthu-datalab.github.io/ml/
18. https://www.jnec.org/labmanuals/cse/te/sem1/Machine%20Learning%20LAB%20MANUAL%2 0(1).pdf
19. http://ais.informatik.uni-freiburg.de/teaching/ws17/deep_learning_course/presentation1a2017.pdf
20. https://kgr.ac.in/storage/2021/08/ML-LAB-MANUAL.pdf
21. https://deepakdvallur.weebly.com/machine-learning-laboratory.html
22. https://pesitsouth.pes.edu/pdf/2019/July/ISE/ML_LAB.pdf

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment: **(i)** **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **II**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS204	
2.	Course Title	**Lab-2: Deep Learning**	
3.	Course Type	**Practical**	
4.	Pre-requisite (if any)	Theoretical knowledge of deep learning concepts	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Implement the various deep learning algorithms in Python. • Learn to work with different deep learning frameworks like Keras, Tensor flow, PyTorch, Caffe etc. • solve real world problems using state-of-art deep learning techniques.	
6.	**Credit Value**	**2**	
7.	**Total Marks**	**Max. Marks: 100**	**Min. Marks: 40**

Part B: Content of the Course

Total Lectures: 30 /Total Hours: 60

Tentative Practical List	**Note:** This is tentative list; the teachers concern can add more program as per requirement.
	1. Basic image processing operations : Histogram equalization, thresholding, edge detection, data augmentation, morphological operations.
	2. Implement SVM/Softmax classifier for CIFAR-10 dataset: (i) using KNN, (ii) using 3 layer neural network.
	3. Study the effect of batch normalization and dropout in neural network classifier.
	4. Familiarization of image labelling tools for object detection, segmentation.
	5. Image segmentation using Mask RCNN, UNet, SegNet.
	6. Object detection with single-stage and two-stage detectors (Yolo, SSD, FRCNN, etc.).
	7. Image Captioning with Vanilla RNNs.
	8. Image Captioning with LSTMs.
	9. Network Visualization: Saliency maps, Class Visualization.
	10. Generative Adversarial Networks.
	11. Chatbot using bi-directional LSTMs.
	12. Familiarization of cloud based computing like Google colab.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press.
2. Li Deng and Dong Yu. Deep Learning Methods and Applications. Foundations and Trends in Signal Processing Volume 7 Issues 3-4, ISSN: 1932-8346.
3. Dr. N.D. Lewis, Deep Learning Made Easy with RA Gentle Introduction for Data Science.

Create Space Independent Publishing Platform (January 10, 2016).

4. François Chollet, JJ Allaire. MEAP Edition Manning Early Access Program Deep Learning w Version 1, Copyright 2017 Manning Publications.

E-RESOURCES:

1. http://paulorauber.com/slides/deep_learning_lab.pdf
2. http://www.jnit.org/wp-content/uploads/2020/04/Machine-Learning-Lab-Manual.pdf
3. http://www.hpc.iitkgp.ac.in/pdfs/AI_HPC.pdf
4. https://nthu-datalab.github.io/ml/
5. https://www.jnec.org/labmanuals/cse/te/sem1/Machine%20Learning%20LAB%20MANUAL%20(1).pdf
6. http://ais.informatik.uni-freiburg.de/teaching/ws17/deep_learning_course/presentation1a2017.pdf
7. https://kgr.ac.in/storage/2021/08/ML-LAB-MANUAL.pdf
8. https://deepakdvallur.weebly.com/machine-learning-laboratory.html
9. https://pesitsouth.pes.edu/pdf/2019/July/ISE/ML_LAB.pdf

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment:	
(i) **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. (ii) **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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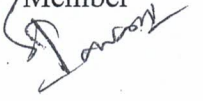   Govt. E.R.R. Science P.G. College, Bilaspur (C.G.)

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Date: 16.03.2022

Part A: Introduction			
Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **II**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS205	
2.	Course Title	**Image Processing**	
3.	Course Type	**Theory**	
4.	Pre-requisite (if any)	Basic knowledge of multimedia software	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • To Review the formation of digital image and its various formats.[Understand] • Compare various filtering techniques in spatial domain and frequency domain.[Analyze] • Implement various algorithms on core image processing on MATLAB software[Apply] • Correlate color domain image processing technique with gray level.[Analyze] • Create Matlab program to apply morphological operators and Image Segmentation.[Create]	
6.	Credit Value	4	
7.	Total Marks	Max. Marks: 100	Min. Marks: 40

Part B: Content of the Course		
Total Hours/Lectures: 60		

Unit	Topics	No. of Periods
I.	**Introduction To Digital Image Processing:** Fundamentals of Elements of Digital Image, Image as Data, Pixels, Components of Digital Image, Types of Image Representation, Measures of Image, Application of Digital Image Processing.	12
II.	**Matlab Basics:** Data Types, Operators, Matrices, File, I/O, Image Processing Toolbox. **Image Enhancement:** Spatial Domain & Frequency Domain.	12
III.	**Image Filtering Techniques:** Low Pass Filters – Smoothing, High Pass Filters - Edge Detection, Sharpening, Image Degradation/Restoration: Noise Models, Model of Image Degradation/Restoration Process, Noise Reduction, Inverse Filtering, M Minimum Mean Square Error (Weiner) Filtering.	12
IV.	**Color Image Fundamentals:** Color Models, Representation of Color in Images, Color Image Processing, Basics of Color Image Processing Smoothing And Sharpening, Image Morphology: Different Morphological Algorithm, Morphological Measures.	12
V.	**Image Segmentation:** Thresholding, Histogram Based Segmentation, Clustering, Region Growing Method, Point, Line and Edge Detection.	12

Keywords: Image Processing, Spatial Domain, Frequency Domain, Noise Reduction, Edge Detection.

TEXT/REFERENCE BOOKS:

1. "Digital Image processing", R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson education, 2nd Education, 2003.
2. "Fundamentals of Digital Image processing", A.K. Jain , PHI.
3. "Digital Image processing using MAT LAB", Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
4. "Digital Image Processing", Bhabatosh Chanda and Dwijesh Majumder.
5. "Digital Image Processing", William K. Pratt, John Wilely, 3rd Edition, 2004.
6. "Fundamentals of Electronic Image Processing", Weeks Jr., SPIC/IEEE Series, PHI.
7. "Image Processing Analysis and Machine Vision", Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy, 1999.
8. "Digital Image Processing and Applications", Chanda Dutta Magundar, PHI, 2000.

E RESOURCES:

1. https://www.tutorialspoint.com/dip/index.htm
2. https://www.javatpoint.com/digital-image-processing-tutorial
3. https://www.geeksforgeeks.org/digital-image-processing-basics/
4. https://www.mygreatlearning.com/blog/digital-image-processing-explained/
5. https://www.udemy.com/course/advanced-image-processing/
6. https://www.imageprocessingplace.com/root_files_V3/tutorials.htm
7. https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/2018/15EI403J-image-processing%20lab-manual.pdf
8. https://bmsce.ac.in/Content/ML/DIP_Manual.pdf
9. https://www.jnec.org/labmanuals/entc/be/sem1/dip.pdf
10. https://titagartala.ac.in/wp-content/uploads/2018/12/Digital-Lab-Processing-Lab-Manual.pdf
11. https://coeosmanabad.ac.in/wp-content/uploads/2020/03/BE-DIP-Lab-Manual.pdf
12. http://www.eng.tau.ac.il/~bilevich/Image_Processing/Lab_Manual_Image_Processing.pdf
13. https://www.vidyarthiplus.com/vp/Thread-BM2406-DIGITAL-IMAGE-PROCESSING-LAB-MANUAL-REC-Edition
14. https://www.vidyarthiplus.com/vp/attachment.php?aid=4408
15. https://gnindia.dronacharya.info/CSE/Downloads/Labmanuals/DIP-Lab-Manual.pdf
16. https://processing.org/tutorials/pixels

Part D: Assessment and Evaluation

Maximum Marks: 100
End Semester Examination(ESE): 75 Marks
Internal Assessment(IA): 25 Marks

Internal Assessment:	
(i) **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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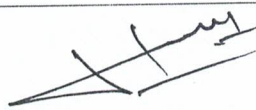
   \- Member

Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **II**	w.e.f. Academic Session: **2022-23**	
1.	Course Code		**MTCS206**	
2.	Course Title		**Internet of Things**	
3.	Course Type		**Theory**	
4.	Pre-requisite (if any)		Programming skills and basic knowledge of cloud computing	
5.	Course Learning. Outcomes (CLO)		At the end of this course, the students will be able to: • Understand general concepts of Internet of Things (IoT). • Recognize various devices, sensors and applications. • Apply design concept to IoT solutions. • Analyze various M2M and IoT architectures. • Evaluate design issues in IoT applications. • Create IoT solutions using sensors, actuators and Devices.	
6.	**Credit Value**		**4**	
7.	**Total Marks**	**Max. Marks: 100**		**Min. Marks: 40**

Part B: Content of the Course

Total Hours/Lectures: 60

Unit	Topics	No. of Periods
I.	**IoT**: What is the IoT and why is it important? Elements of an IoT ecosystem, Technology drivers, Business drivers, Trends and implications, Overview of Governance, Privacy and Security Issues.	12
II.	**IoT Protocols**: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE802.15.4–BACNet Protocol– Modbus – KNX – Zigbee– Network layer – APS layer – Security.	12
III.	**IoT Architecture:** IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity: An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.	12
IV.	**Web of Things:** Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.	12
V.	**IoT Applications:** IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Study of existing IoT platforms /middleware, IoT- A, Hydra etc., Developing IoT solutions: Introduction to Python, Introduction to different IoT tools, Introduction to Arduino and Raspberry Pi Implementation of IoT with Arduino and Raspberry, Cloud Computing, Fog Computing, Connected Vehicles, Data Aggregation for the IoT in Smart Cities, Privacy and Security Issues in IoT.	12

Part C - Learning Resources
Text Books, Reference Books and E-Resources

TEXT/REFERENCE BOOKS:

1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", Cambridge University Press, 2010.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.
5. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
6. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
7. Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011.
8. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on Approach)", 1st Edition, VPT, 2014.

E RESOURCES:

1. Swayam/NPTEL: https://www.youtube.com/channel/UC6ZY_csXZc7YZZm2W8HcQ6A
2. Coursera: https://www.coursera.org/search?query=internet%20of%20things&
3. Javatpoint: https://www.javatpoint.com/iot-internet-of-things
4. Tutorialspoint: https://www.tutorialspoint.com/internet_of_things/index.htm
5. Topics Related to IOT from data-flair: https://data-flair.training/blogs/iot-tutorial/
6. Topics Related to IOT from edureka: https://www.edureka.co/blog/iot-tutorial/
7. https://www.lnmiit.ac.in/Department/ECE/uploaded_files/Internet_of_Things_Lab_manual.pdf
8. https://www.iare.ac.in/sites/default/files/lab1/IARE_IOT%20LAB%20_MANUAL.pdf
9. https://www.amirajcollege.in/wp-content/uploads/2020/06/2180709-iot_manual.pdf
10. https://peer.asee.org/internet-of-things-iot-laboratory.pdf
11. https://www.teachmint.com/tfile/studymaterial/class-7th/internetofthingsiot/iotlabmanualpdf/d85015cf-722b-4b50-86e4-0f456f91bfa0
12. https://www.slideshare.net/RadheyShyam18/iot-lab-manual-new
13. https://www.psgrkcw.ac.in/wp-content/uploads/2021/08/IoT-Applications-Lab-Manual-IT.pdf
14. https://www.coursehero.com/file/37028140/IoT-Lab-Manualpdf/
15. https://www.scribd.com/document/408744059/IoT-Lab-Manual
16. https://mrcet.com/CSE_downloads.html
17. http://iotmumbai.bharatividyapeeth.edu/index.php/lab-manuals#computer-technology

Part D: Assessment and Evaluation

Maximum Marks: 100 End Semester Examination(ESE): 75 Marks Internal Assessment(IA): 25 Marks	
Internal Assessment: **(i)** **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**	Semester: **II**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS207
2.	Course Title	**Natural Language Processing**
3.	Course Type	**Theory**
4.	Pre-requisite (if any)	Basic knowledge of programming concepts
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Understand Natural Language Processing. • Probabilistic model of defining language and techniques. • Understand Hidden Markov model and Speech Recognition. • Application of context free grammar and language parsing. • Implement probabilistic and language parsing. • Differentiation of semantic and discourse in terms of NLP.
6.	Credit Value	4
7.	Total Marks	Max. Marks: 100 Min. Marks: 40

Part B: Content of the Course

Total Hours/Lectures: 60

Unit	Topics	No. of Lectures
I.	**Introduction to NLP:** What is NLP? Why NLP is Difficult? History of NLP, Advantages of NLP, Disadvantages of NLP, Components of NLP, Applications of NLP, How to build an NLP pipeline? Phases of NLP, NLP APIs, NLP Libraries.	12
II.	**Language Modeling and Part of Speech Tagging:** Unigram Language Model, Bigram, Trigram, N-gram, Advanced smoothing for language modeling, Empirical Comparison of Smoothing Techniques, Applications of Language Modeling, Natural Language Generation, Parts of Speech Tagging, Morphology, Named Entity Recognition.	12
III.	**Words and Word Forms:** Bag of words, skip-gram, Continuous Bag-Of-Words, Embedding representations for words Lexical Semantics, Word Sense Disambiguation, Knowledge Based and Supervised Word Sense Disambiguation.	12
IV.	**Text Analysis, Summarization and Extraction:** Sentiment Mining, Text Classification, Text Summarization, Information Extraction, Named Entity Recognition, Relation Extraction, Question Answering in Multilingual Setting; NLP in Information Retrieval, Cross-Lingual IR.	12
V.	**Machine Translation:** Need of MT, Problems of Machine Translation, MT Approaches, Direct Machine Translations, Rule-Based Machine Translation, Knowledge Based MT System, Statistical Machine Translation (SMT), Parameter learning in SMT (IBM models) using EM), Encoder-decoder architecture, Neural Machine Translation. Pre-trained language model like: BERT, BART, PEGASUS, Hugging face etc.	12

Keywords: Natural Language Processing (NLP), Unigram Language Model, Bigram, N-gram, Sentiment mining.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

TEXT/REFERENCE BOOKS:

1. Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2. Charu C. Aggarwal, Machine Learning for Text, Springer, 2018 edition.
3. Christopher D. Manning and Hinrich Schuetze, Foundations of Statistical Natural Language Processing, MIT press, 1999.
4. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media: 1st edition, 2009.
5. Roland R. Hausser, Foundations of Computational Linguistics: Human Computer Communication in Natural Language, Paperback, MIT press, 2011.
6. Breck Baldwin, Language Processing with Java and Ling Pipe Cook book, Atlantic Publisher, 2015.
7. Richard M Reese, Natural Language Processing with Javall, O'Reilly Media, 2015.
8. Nitin Indurkhya and Fred J. Damerau, Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
9. Tanveer Siddiqui, U.S. Tiwary, Natural Language Processing and Information Retrieval, Oxford University Press, 2008.
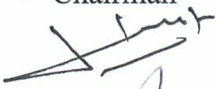
E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc19_cs56/preview
2. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc19_cs57/preview
3. Swayam/NPTEL: https://www.classcentral.com/course/swayam-natural-language-processing-7950
4. Cousera: https://www.coursera.org/search?query=Natural%20Language%20Processing&
5. https://www.cs.princeton.edu/courses/archive/fall20/cos109/labs/python-nlp/index.html
6. https://nlp-iiith.vlabs.ac.in/Introduction.html
7. https://studylib.net/doc/25812016/nlp-lab-manual
8. https://web.stanford.edu/class/archive/cs/cs224n/cs224n.1162/handouts/cs224n-lecture1-6up.pdf
9. https://www.iitp.ac.in/~ai-nlp-ml/course/dnlp/Lec-Introduction-CEP.pdf
10. https://www.tutorialspoint.com/natural_language_processing/index.htm#:~:text=Language%20is%20a%20method%20of,understand%20and%20process%20human%20language.
11. https://www.javatpoint.com/nlp
12. https://www.analyticsvidhya.com/blog/2021/09/complete-tutorial-on-natural-language-processing-using-spacy/
13. https://towardsai.net/p/nlp/natural-language-processing-nlp-with-python-tutorial-for-beginners-1f54e610a1a0
14. https://www.guru99.com/nlp-tutorial.html
15. https://www.datacamp.com/tutorial/tutorial-natural-language-processing

Part D: Assessment and Evaluation

Maximum Marks: 100 End Semester Examination(ESE): 75 Marks Internal Assessment(IA): 25 Marks	
Internal Assessment: **(i)** **Unit test (15 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. **(ii)** **Presentation/Assignment (10 Marks)**	**Total:** 25 Marks

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   C.M. Dubey P.G. College, Bilaspur(C.G.)
   — Member

Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) I Year**		Semester: **II**	w.e.f. Academic Session: **2022-23**
1.	Course Code		MTCS208	
2.	Course Title		**Research Paper Writing**	
3.	Course Type		**Theory**	
4.	Pre-requisite (if any)		No	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: - Find research resources, such as online resources (research databases, reference lists), and campus resources (writing centers, research librarian help). - Evaluate the credibility of research sources, especially the online resources. - Find reference articles including scholarly articles from journals and news articles from foreign and domestic news sources. - Learn strategies to avoid plagiarism and academic dishonesty such as using APA/MLA citation styles preparing a bibliography (references list), etc. - Write effective and well-organized research papers that are supported by information from several different, credible sources. - Document sources correctly and incorporate information from sources while following the principles of academic honesty. - Write for an academic audience using format, organization, and vocabulary appropriate to academic writing in English. - Revise writing according to peer and instructor feedback as well as self-edit. - Learn about what to write in each section. - Understand the skills needed when writing a Title. - Ensure the good quality of paper at very first-time submission.			
6.	Credit Value		2	
7.	Total Marks	Max. Marks: 50		Min. Marks: 20

Part B: Content of the Course

Total Hours/Lectures: 30

Unit	Topics	No. of Periods
I.	**Introduction:** Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee, searching research paper from different databases.	6

II.	**Planning and Preparation:** Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness, Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction.	6
III.	**Review of the Literature:** Methods, Results, Discussion, Conclusions, The Final Check, Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a useful phrases, how to ensure paper is as good as it could possibly be the first-time submission review of the Literature, skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions, useful phrases, how to ensure paper is as good as it could possibly be the first-time submission.	6
IV.	**Paper quality:** Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission	6
V.	**Software Tools:** Google scholar, online paper submission system like Easy chair, Citation and referencing styles: APA, MLA. IEEE etc., Reference management tool: MS-Word, Mendeley, Zotero etc., Research gate, ORCID Id, Google Scholar profile, Scopus profile etc.	6

Keywords: Plagiarism, Literature Review, Journal Citation Report, Mendeley, Research proposal.

Part C - Learning Resources
Text Books, Reference Books and E-Resources

TEXT/ REFERENCE BOOKS:

1. Goldbort R (2006) Writing for Science, Yale University Press.
2. Day R (2006) How to Write and Publish a Scientific paper, Cambridge University Press.
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork , English for Writing Rescarch Papers, Springer New York Dordrecht Heidelberg London, 2011.

E-RESOURCES:

1. Swayam/NPTEL: https://onlinecourses.swayam2.ac.in/ntr20_ed30/preview
2. Swayam/NPTEL: https://onlinecourses.swayam2.ac.in/cec21_ge32/preview
3. Coursera: https://www.coursera.org/search?query=RESEARCH%20PAPER%20WRITING%20
4. https://www.scribbr.com/category/research-paper/
5. https://www.grammarly.com/blog/how-to-write-a-research-paper/
6. https://thebestschools.org/resources/how-to-write-research-paper/
7. https://owl.purdue.edu/owl/general_writing/common_writing_assignments/research_papers/index.html
8. https://www.coursera.org/learn/academic-writing-capstone

Part D: Assessment and Evaluation

Maximum Marks: 50 End Semester Examination(ESE): 32 Marks Internal Assessment(IA): 18 Marks	
Internal Assessment: (i) **Unit test (10 Marks):** There will be three tests of 15 marks. Each out of which average mark of best two tests will be considered. (ii) **Presentation/Assignment (8 Marks)**	**Total:** 18 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) II Year**	Semester: **II**	w.e.f. Academic Session: **2022-23**

1.	Course Code	**MTCS209**
2.	Course Title	MOOC/Internship
3.	Course Type	**Practical**
4.	Pre-requisite (if any)	Not required
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Join and explore MOOC courses from reputed platforms. • Enhance knowledge on latest techniques. • Make ready for IT industry. • Up skill knowledge.
6.	Credit Value	2
7.	Total Marks	Max. Marks: 50 Min. Marks: 20

Part B: Important Guidelines

Total Hours: 60

1. Student has to complete at least one MOOC course or internship.
2. Student should register for any MOOC course from SWAYAM/NPTEL/Coursera/Edx etc. or as notified by the department from time to time under the guidance of mentor and certificate of completion must be submitted in the department.
3. MOOC courses will be notified at the beginning of each semester and student has to opt from the list only.
4. Student not able to enroll or complete MOOC course due to any valid reasons shall be assigned similar task by the HOD/Mentor as an alternative option.
5. At the end of the semester student has to present MOOC or patent in front of internal/Mentor.
6. Student has to take prior approval of MOOC.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

NA

Part D: Assessment and Evaluation

Maximum Marks: 50
Internal Assessment (IA): 50 Marks

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<table>
<tr><td colspan="4" align="center">**Part A: Introduction**</td></tr>
<tr><td colspan="2">Program: **Master Degree**</td><td>Class: **M. Tech. (CS) II Year**</td><td>Semester: **II** | w.e.f. Academic Session: **2022-23**</td></tr>
<tr><td>1.</td><td>Course Code</td><td colspan="2" align="center">MTCS301</td></tr>
<tr><td>2.</td><td>Course Title</td><td colspan="2" align="center">**Dissertation Phase – I**</td></tr>
<tr><td>3.</td><td>Course Type</td><td colspan="2" align="center">**Practical**</td></tr>
<tr><td>4.</td><td>Pre-requisite (if any)</td><td colspan="2" align="center">Programming and research knowledge as per project topic</td></tr>
<tr><td>5.</td><td>Course Learning. Outcomes (CLO)</td><td colspan="2">At the end of this course, the students will be able to:
• Demonstrate a sound technical knowledge of their selected project topic.
• Undertake identification, formulation and solution.
• Enhance research skill.
• Find out research gape.
• Up skill research based approach.
• Solve the real world problems through research.
• Demonstrate the knowledge, skills and attitudes of a professional.</td></tr>
<tr><td>6.</td><td>**Credit Value**</td><td colspan="2" align="center">**14**</td></tr>
<tr><td>7.</td><td>**Total Marks**</td><td align="center">**Max. Marks: 500**</td><td align="center">**Min. Marks: 200**</td></tr>
</table>

<table>
<tr><td align="center">**Part B: Important Guidelines for Dissertation**</td></tr>
<tr><td align="center">Total Hours: 420</td></tr>
</table>

A project report has to be submitted as per the rules described below:

1. **Number of Copies:** The student should submit one hard bound copy of the Project Report with one RW/CD/DVD.
2. **No of students:** Every student has to submit separate dissertation.
3. **Acceptance /Rejection of dissertation:** The student must submit a report to the Head of Department/Project Guide for approval. The Head of Department/Project Guide holds the right to accept the project or suggest modifications for resubmission.
4. **Format of the Project Report :** The student must adhere strictly to the following format for the submission of the Project Report

    I. **Paper:** The report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The report to be submitted to the University must be original and subsequent copies may be photocopied on any paper.

    II. **Typing:** The typing shall be of standard letter size, double-spaced and on one side of the paper only, using black ribbons and black carbons.

    III. **Margins:** The typing must be done in the following margins

    Left ----- 35mm, Right ----- 20mm

    Top ----- 35mm, Bottom ----- 20mm

    IV. **Binding:** The Report shall be Rexene bound in black. Plastic, spiral bound Project Reports not be accepted.

    V. **Front Cover:** The front cover should contain the following details:

    TOP: The title in block capitals of 6mm to 15mm letters.

    CENTER: Full name in block capitals of 6mm to 10mm letters.

    BOTTOM: Name of the University, year of submission- all in block

capitals of 6mm to 10mm letters on separate lines with proper spacing and centring.

VI. **Blank Sheets:** At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

5. **Abstract:** Every dissertation should have an abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters, section, subsection etc.

6. **Certificates etc:** The report should contain the following:
   I. Certificates
   II. Institute Certificate: Successful completion of project by competent authority.
   III. Acknowledgment
   IV. List of Figures
   V. List of Tables
   VI. List of abbreviations

7. **Contents of the dissertation:** The report must contain following in form of chapter, however student may include any other relevant chapter(s):
   I. **Research Topic:** Need to choose real world topic of the research and write scope and abstract of the research in 500 words.
   II. **Literature Review:** Review of at least 50 research papers from popular databases like science direct
   III. **Methodology:** Brief description of the methods and techniques used in the research work.
   IV. **Model or software development**: Brief about models developed or any system / software developed for the proposed research work.
   V. **Conclusion:** Concluding remark of the research work.
   VI. **Reference:** Must be in APA format.
   Annexure (If any)

Part C - Learning Resources
Text Books, Reference Books and E-Resources
As per the topic of the dissertation
Part D: Assessment and Evaluation
Maximum Marks: 500 End Semester Examination(ESE): 500 Marks

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Date: 16.03.2022

Part A: Introduction

Program: **Master Degree**	Class: **M. Tech. (CS) II Year**	Semester: **III**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS302	
2.	Course Title	**MOOC/Patent**	
3.	Course Type	**Practical**	
4.	Pre-requisite (if any)	Not required	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: - Join and explore MOOC courses from reputed platforms. - Enhance knowledge on latest techniques. - Make ready for IT industry. - Up skill knowledge	
6.	**Credit Value**	**2**	
7.	**Total Marks**	Max. Marks: **100**	Min. Marks: **40**

Part B: Important Guidelines

Total Hours: 60

1. Student has to complete two MOOC courses or one MOOC course and one patent or two patents.
2. Student should register for any MOOC course from SWAYAM/NPTEL/Coursera/Edx etc. or as notified by the department from time to time under the guidance of mentor and certificate of completion must be submitted in the department.
3. MOOC courses will be notified at the beginning of each semester and student has to opt from the list only.
4. Student not able to enroll or complete MOOC course due to any valid reasons shall be assigned similar task by the HOD/Mentor as an alternative option.
5. Patent must be awarded.
6. At the end of the semester student has to present MOOC or patent in front of internal/Mentor.
7. Student has to take prior approval of MOOC.

Part C - Learning Resources

Text Books, Reference Books and E-Resources

NA

Part D: Assessment and Evaluation

Maximum Marks: 100
Internal Assessment (IA): 100 Marks

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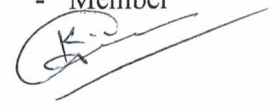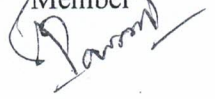   C.M. Dubey P.G. College, Bilaspur(C.G.)

   \- Member

Date: 16.03.2022

Part A: Introduction			
Program: **Master Degree**	Class: **M. Tech. (CS) II Year**	Semester: **III**	w.e.f. Academic Session: **2022-23**

1.	Course Code	MTCS401	
2.	Course Title	Dissertation Phase – II	
3.	Course Type	Practical	
4.	Pre-requisite (if any)	Programming and research knowledge as per project topic	
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: - Demonstrate a sound technical knowledge of their selected project topic. - Undertake identification, formulation and solution. - Enhance research skill. - Find out research gape. - Up skill research based approach. - Solve the real world problems through research. - Demonstrate the knowledge, skills and attitudes of a professional.	
6.	**Credit Value**	16	
7.	**Total Marks**	**Max. Marks: 500**	**Min. Marks: 200**

Part B: Important Guidelines for Dissertation
Total Hours: 240

A project report has to be submitted as per the rules described below:

1. **Number of Copies:** The student should submit One hard bound copy of the Project Report with one RW/CD/DVD.
2. **No of students:** Every student has to submit separate dissertation.
3. **Acceptance /Rejection of dissertation:** The student must submit a report to the Head of Department/Project Guide for approval. The Head of Department/Project Guide holds the right to accept the project or suggest modifications for resubmission.
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    II. **Typing:** The typing shall be of standard letter size, double-spaced and on one side of the paper only, using black ribbons and black carbons.

    III. **Margins:** The typing must be done in the following margins

    > Left ----- 35mm, Right ----- 20mm
    > Top ----- 35mm, Bottom ----- 20mm

    IV. **Binding:** The Report shall be Rexene bound in black. Plastic, spiral bound Project Reports not be accepted.

    V. **Front Cover:** The front cover should contain the following details:

    > **TOP:** The title in block capitals of 6mm to 15mm letters.
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VI. **Blank Sheets:** At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.

5. **Abstract:** Every dissertation should have an abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters, section, subsection etc.

6. **Certificates etc:** The report should contain the following:
   I. Certificates
   II. Institute Certificate: Successful completion of project by competent authority.
   III. Acknowledgment
   IV. List of Figures
   V. List of Tables
   VI. List of abbreviations

7. **Contents of the dissertation:** The report must contain following in form of chapter, however student may include any other relevant chapter(s):
   I. **Research Topic:** Need to choose real world topic of the research and write scope and abstract of the research in 500 words.
   II. **Literature Review:** Review of at least 50 research papers from popular databases like science direct
   III. **Methodology:** Brief description of the methods and techniques used in the research work.
   IV. **Model or software development:** Brief about models developed or any system / software developed for the proposed research work.
   V. **Conclusion:** Concluding remark of the research work.
   VI. Reference: Must be in APA format.
   Annexure (If any)

Part C - Learning Resources
Text Books, Reference Books and E-Resources
As per the topic of the dissertation

Part D: Assessment and Evaluation
Maximum Marks: 500 End Semester Examination(ESE): 500 Marks

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Date: 16.03.2022

		Part A: Introduction		
Program: **Master Degree**		Class: **M. Tech. (CS) II Year**	Semester: **III**	w.e.f. Academic Session: **2022-23**
1.	Course Code	MTCS402		
2.	Course Title	MOOC/Patent		
3.	Course Type	Practical		
4.	Pre-requisite (if any)	Not required		
5.	Course Learning. Outcomes (CLO)	At the end of this course, the students will be able to: • Join and explore MOOC courses from reputed platforms. • Enhance knowledge on latest techniques. • Make ready for IT industry. • Up skill knowledge		
6.	**Credit Value**	**2**		
7.	**Total Marks**	**Max. Marks: 100**	**Min. Marks: 40**	

Part B: Important Guidelines
Total Hours: 60
1. Student has to complete two MOOC courses or one MOOC course and one patent or two patents.   2. Student should register for any MOOC course from SWAYAM/NPTEL/Coursera/Edx etc. or as notified by the department from time to time under the guidance of mentor and certificate of completion must be submitted in the department.   3. MOOC courses will be notified at the beginning of each semester and student has to opt from the list only.   4. Student not able to enroll or complete MOOC course due to any valid reasons shall be assigned similar task by the HOD/Mentor as an alternative option.   5. Patent must be awarded.   6. At the end of the semester student has to present MOOC or patent in front of internal/Mentor.   7. Student has to take prior approval of MOOC.

Part C - Learning Resources
Text Books, Reference Books and E-Resources
NA
Part D: Assessment and Evaluation
Maximum Marks: 100   Internal Assessment (IA): 100 Marks

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